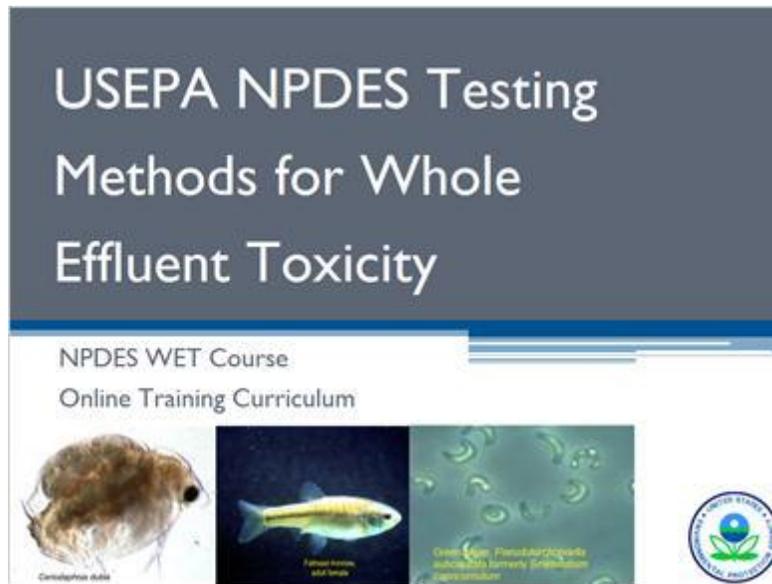


Module 2: USEPA NPDES Testing Methods for WET



Notes:

Welcome to this presentation on the United States Environmental Protection Agency's, hereafter USEPA, Testing Methods for Whole Effluent Toxicity, or WET. This presentation is part of a Web-based training series on Whole Effluent Toxicity sponsored by the USEPA Office of Wastewater Management's Water Permits Division.

You can review this stand-alone presentation, or, if you have not already done so, you might also be interested in viewing the other presentations in the series, which cover the use of Whole Effluent Toxicity in the NPDES permits program.

Before we get started with this presentation, I'll make some introductions and cover two important housekeeping items.

Module 2: USEPA NPDES Testing Methods for WET

Presenters

- *Laura Phillips*
EPA HQ WET Coordinator
U.S. Environmental Protection Agency
Washington, DC
- *Marcus Bowersox*
Aquatic Toxicologist
Tetra Tech, Incorporated
Owings Mills, MD

Reference: USEPA
WET Test Methods

2

Notes:

First, the introductions.

Your speakers for this presentation are, me, Laura Phillips, USEPA's National WET Coordinator with the Water Permits Division within the Office of Wastewater Management at the USEPA in Washington D.C., and Marcus Bowersox, USEPA HQ's contractor and an aquatic toxicologist with Tetra Tech, Incorporated in Owings Mills, Maryland. Second, now for those housekeeping items.

You should be aware that all the materials used in this presentation have been reviewed by USEPA staff for technical and programmatic accuracy; however, the views of the speakers are their own and do not necessarily reflect those of USEPA. The NPDES permits program, which includes the use of Whole Effluent Toxicity testing, is governed by the existing requirements of the Clean Water Act and USEPA's NPDES permit implementation regulations. These statutory and regulatory provisions contain legally binding requirements. However, the information in this presentation is not binding. Furthermore, it supplements, and does not modify, existing USEPA policy and guidance on Whole Effluent Toxicity under the NPDES permits program. USEPA may revise and/or update this presentation in the future.

Also, this module was developed based on the live USEPA HQ's NPDES WET course that the Water Permits Division of the Office of Wastewater Management has been teaching to USEPA regions and states for several

Module 2: USEPA NPDES Testing Methods for WET

years. This course, where possible, has been developed with both the non-scientist and scientist in mind, and while not necessary, it is recommended that a basic knowledge of biological principles and Whole Effluent Toxicity will be helpful to the viewer. Prior to this course, a review of the USEPA's Permit Writer's online course, which is also available at USEPA's NPDES website, is recommended.

When appropriate a blue button will appear on a slide. By clicking this button, additional slides will present information regarding either freshwater or marine USEPA WET test methods. When these additional slides are finished, you will be automatically returned to the module slide where you left off. The blue button on this slide provides the references for USEPA's WET test methods that will be presented throughout this module.

Alright. Marcus will guide us through the USEPA WET test methods used to conduct Whole Effluent Toxicity testing for the NPDES permits program.

Module 2: USEPA NPDES Testing Methods for WET

What is a WET Test?

- WET = Whole Effluent Toxicity
- Measures effects of an effluent sample on live organisms
- A controlled laboratory experiment
- Uses standardized procedures and analyses



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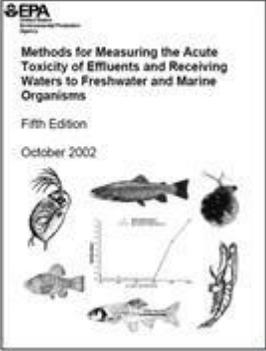
Notes:

First, let's define WET, or Whole Effluent Toxicity. WET tests are controlled laboratory experiments using standardized procedures and analyses to measure effects of a permitted effluent sample on live WET test aquatic organisms. Depending on the test endpoint being measured (lethality versus sublethal effects), WET tests are considered to be acute or chronic. In acute tests, the exposure periods are considered short-term and therefore are no longer than 96 hours measuring only lethality, defined as the ability to survive after exposure to an effluent. Chronic tests assess possible impacts from effluent exposure to aquatic test organisms for critical lifecycle measurements and therefore may be longer than 96 hours and are usually conducted for 7 days, or in some cases up to 8 days maximum. Chronic tests measure both lethality and immobility and sublethal endpoints such as growth, development, and reproduction.

Module 2: USEPA NPDES Testing Methods for WET

USEPA WET Methods Manuals

- Health and safety
- Quality assurance
- Facilities, equipment, supplies
- Test organisms
- Dilution water
- Effluent sampling and handling
- Test methods
- Report preparation

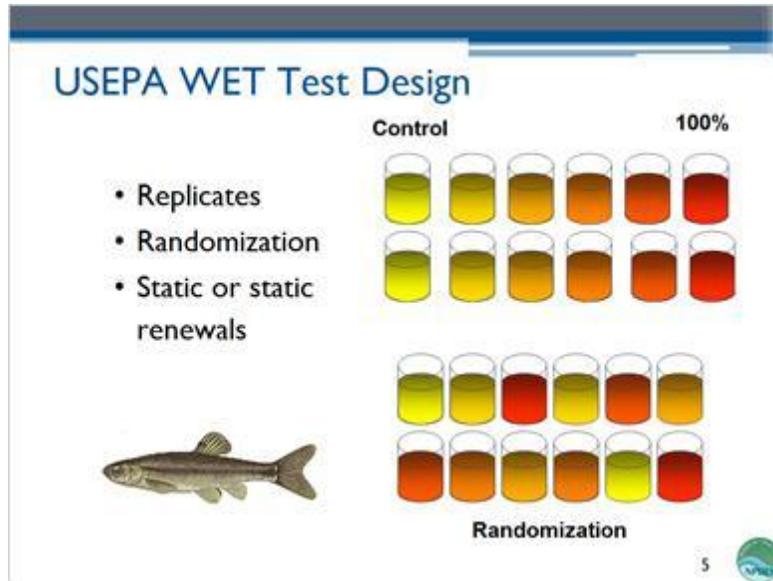


4 

Notes:

The USEPA has standardized WET test methods for freshwater and marine test organisms. The current USEPA WET test methods manuals were released in 2002 for freshwater and East Coast marine species, whereas the current USEPA West Coast marine WET test manual was released in 1995. These documents define many important aspects of WET test methods for each USEPA approved test species, including, but not limited to, test organism culturing and handling, health and safety, quality assurance, facilities, equipment and supplies, dilution water, effluent sampling and handling, and report preparation. Many of these subjects are discussed in more detail later in this module.

Module 2: USEPA NPDES Testing Methods for WET



Notes:

The test set-up or test design for each of the WET test methods is specific to the test organisms and may include different requirements, such as: the number of replicates, randomization of test chambers, and whether to conduct tests using either a static, static-renewal, or flow-through mode. A static test is one in which the test solution that organisms are exposed to is the same throughout the exposure, whereas in a static-renewal test, the solution in the test chambers is replaced with fresh solutions after some predetermined amount of time, typically 24 or 48-hours. In many instances, a static-renewal test will incorporate more than one effluent sample to account for possible effluent variability over time. For the promulgated USEPA WET test methods, all WET tests used for NPDES permitting must consist of a control and five serial dilutions of the effluent. Dilutions of effluent should be made with one of two types of water, as described in the next slide.

Module 2: USEPA NPDES Testing Methods for WET

Selection of Dilution Water

- Laboratory water or receiving water
- Choice of water is dependent on the objectives of the test.
 - Absolute toxicity: use standard lab dilution water
 - Estimate of toxicity in uncontaminated receiving water: use receiving water
 - Contaminated receiving water: use lab water



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Notes:

USEPA's WET testing methods indicate that WET tests should be conducted using one of two choices of dilution water: receiving water or laboratory water. The choice of dilution water is dependent on the objectives of the WET test. If the objective is to determine the absolute toxicity of the effluent alone, then standard laboratory water would be used. If an estimate of the toxicity in receiving water is the objective, then receiving water that is known to be non-toxic to the WET test species would be used. Generally, receiving water upstream or outside of the area affected by an effluent discharge should be used in this case. If the receiving water is known or suspected to be contaminated, then standard laboratory water should be used.

Module 2: USEPA NPDES Testing Methods for WET

Taxonomic Diversity

- At least two species (fish and invertebrate) should be used for acute testing.
 - Each species should be tested at least 3 times to determine the most sensitive species.
- At least three species representing different trophic levels (fish, invertebrate, plant or algae) should be tested when chronic WET monitoring is required.
 - Each species should be tested at least 3 times to determine the most sensitive species.

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Notes:

According to USEPA's 1991 Technical Support Document for Water Quality-based Toxics Control, or TSD, it is recommended that at least two USEPA approved WET test species, representing different trophic levels, such as a fish and an invertebrate, should be used in acute WET tests. For chronic WET tests, USEPA recommends testing with at least three USEPA approved WET test species, including a fish, an invertebrate, and a plant or algae. Under both acute and chronic WET testing, each test species should be assessed against the permitted effluent at least 3 times to determine the most sensitive test species to be used for determining whether there is or may be an excursion of a state's water quality standard and/or for monitoring to determine compliance with NPDES WET permit limits. USEPA has developed test methods for acute and chronic WET testing using standardized or surrogate WET test species for each of the three trophic levels.

Module 2: USEPA NPDES Testing Methods for WET



Notes:

USEPA has standard WET test species for both acute and chronic tests. The pictures presented here represent some of the freshwater test species, including *Ceriodaphnia dubia* (an invertebrate - water flea), *Pseudokirchneriella subcapitata* (formerly *Selenastrum capricornutum* - an algae), *Daphnia magna* (another invertebrate - water flea), *Pimephales promelas* (vertebrate - fathead minnow), and *Oncorhynchus mykiss* (vertebrate - rainbow trout).

Module 2: USEPA NPDES Testing Methods for WET

Acute Freshwater WET Test Methods

	SPECIES	TEST TYPE	ENDPOINTS
Fish	Fathead Minnow <i>Pimephales promelas</i> Rainbow Trout <i>Oncorhynchus mykiss</i> Brook Trout <i>Salvelinus fontinalis</i>	24-, 48-, or 96-h static, renewal, or flowthrough	Survival
Invertebrate	Water Flea <i>Ceriodaphnia dubia</i> <i>Daphnia magna</i> <i>Daphnia pulex</i>	24-, 48-, or 96-h static, renewal, or flowthrough	Survival





Acute Marine
Test Methods

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Notes:

Standard acute fish WET test methods include those for fathead minnows, rainbow trout, and brook trout. Fathead minnows are the standard WET test species for warm-water receiving waters, while rainbow trout or brook trout can be used as test species in those instances where the receiving water may be classified for cold water aquatic life. Standard acute invertebrate WET tests methods include those for the water fleas: *Ceriodaphnia dubia*, *Daphnia magna*, and *Daphnia pulex*. Acute WET tests are typically less than 96-hours long and can be as short as 24-hours. Acute WET tests are typically conducted in static- or static-renewal mode, but could be conducted as a flow-through test if the potential toxicants are volatile. The only endpoints measured in an acute WET test is lethality.

Module 2: USEPA NPDES Testing Methods for WET

Short-Term Chronic Freshwater WET Test Methods

	SPECIES	TEST TYPE	ENDPOINTS
Fish	Fathead Minnow (Method 1000.0) <i>Pimephales promelas</i>	7-day renewal	Growth Survival
Invertebrate	Water Flea (Method 1002.0) <i>Ceriodaphnia dubia</i>	3 brood tests that are 6-8 day renewal	Reproduction Survival
Plant	Green Algae (Method 1003.0) <i>Pseudokirchneriella subcapitata</i> (formerly <i>Selenastrum capricornutum</i>)	96-hour non-renewal	Growth



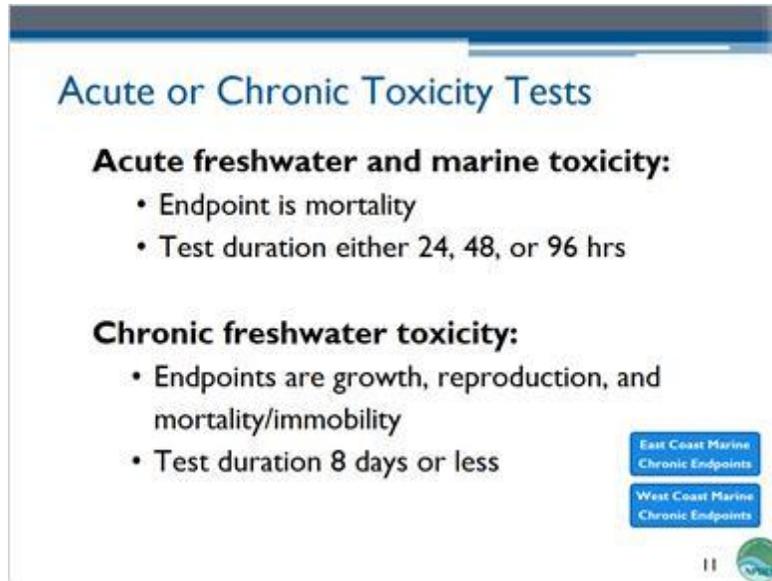

[East Coast Chronic Test Methods](#)
[West Coast Chronic Test Methods](#)

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Notes:

USEPA has three standard species for conducting chronic freshwater WET tests, including: *Pimephales promelas* (the fathead minnow), *Ceriodaphnia dubia* (a water flea), and *Pseudokirchneriella subcapitata* (the green algae). Fathead minnow chronic tests are seven (7) days in length, and the endpoints include mortality/immobilization and growth. *Ceriodaphnia dubia* chronic WET tests are three brood tests which are six (6) to eight (8) days in length depending on the control response, and the endpoints are mortality/immobilization and reproduction. The green algae WET test using *Pseudokirchneriella subcapitata* is ninety-six (96) hours in length, and the endpoint measured is growth in terms of cell density.

Module 2: USEPA NPDES Testing Methods for WET



Acute or Chronic Toxicity Tests

Acute freshwater and marine toxicity:

- Endpoint is mortality
- Test duration either 24, 48, or 96 hrs

Chronic freshwater toxicity:

- Endpoints are growth, reproduction, and mortality/immobility
- Test duration 8 days or less

East Coast Marine Chronic Endpoints
West Coast Marine Chronic Endpoints

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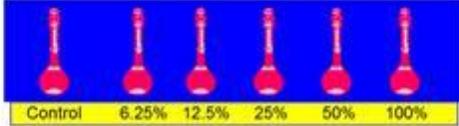
Notes:

This slide summarizes the test endpoints and durations of acute freshwater and marine and chronic freshwater WET tests. Acute WET tests can be 24-, 48-, or 96-hours in length. Typically, acute tests that are over 48-hours in length are conducted in static-renewal mode to prevent overall water quality, especially dissolved oxygen, from changing during the test. For chronic toxicity, the test endpoints include both lethal endpoints, measured as lethality or immobility, as well as sublethal endpoints, measured as growth or reproduction. For freshwater chronic tests, test duration is no longer than 8 days.

Module 2: USEPA NPDES Testing Methods for WET

USEPA WET Test Solutions

- Dilution Water – Negative Control
- Effluent Concentrations – 5 treatments
- Reference Toxicant – Positive Control



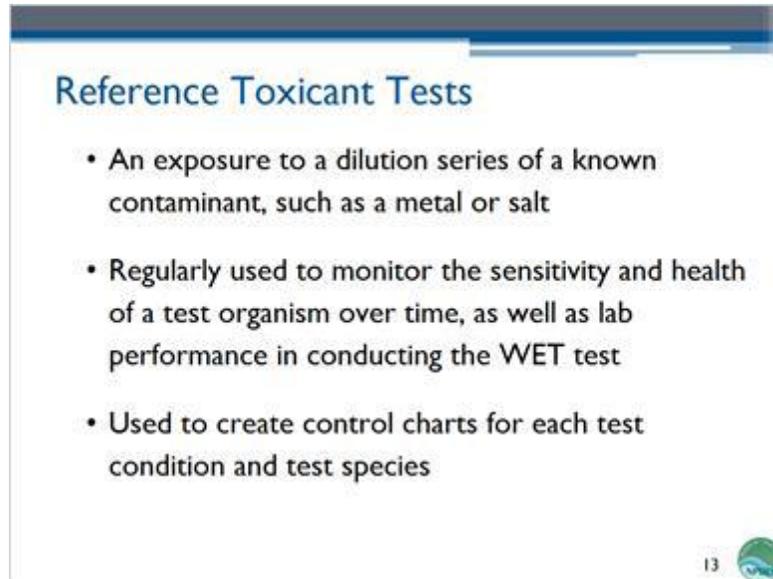
The diagram shows six red test tubes in a row on a blue background. Below each tube is a yellow label with black text: Control, 6.25%, 12.5%, 25%, 50%, and 100%. A small green circular logo is in the bottom right corner of the slide.

Notes:

Two test controls are typically employed for WET testing, a negative control and a positive control. The negative control consists of 100% dilution water. The dilution water could be either receiving water or laboratory water as noted previously, but the responses of the organisms in the negative control must meet USEPA's WET test methods' Test Acceptability Criteria, or TACs, for each WET test species in order for the WET test to produce valid data for NPDES permit compliance purposes. USEPA's TACs for different WET test methods are discussed later in this module.

WET tests used in the NPDES permits program must consist of five effluent dilutions plus a control in order to determine the effects of the effluent at different effluent concentrations. These effluent concentrations should include the In-stream Waste Concentration, or IWC, and other effluent concentrations that bracket the IWC (i.e., some less and some greater) to allow for an effective evaluation of the concentration-response pattern observed in the test. In addition to the negative control, a positive control is generally conducted using a separate reference toxicant test that may or may not be run concurrently with the effluent test. Reference toxicant testing will be discussed more in the next slide.

Module 2: USEPA NPDES Testing Methods for WET



Reference Toxicant Tests

- An exposure to a dilution series of a known contaminant, such as a metal or salt
- Regularly used to monitor the sensitivity and health of a test organism over time, as well as lab performance in conducting the WET test
- Used to create control charts for each test condition and test species

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Notes:

The 2002 USEPA WET test methods define a reference toxicant tests as an exposure to a dilution series of a known contaminant, such as a metal or salt for which the WET test organism response is well established. The choice of reference toxicants is typically lab and species specific, however, they should be fairly stable chemicals that are soluble in water at concentrations that are toxic to the WET test species. Potassium chloride, sodium chloride, and copper sulfate, for example, are all suitable reference toxicants. A reference toxicant testing program is used as part of a laboratory Quality Assurance (QA) program to demonstrate the sensitivity and health of test organisms used in WET tests over time, as well as an approach for determining a lab's performance in conducting the WET tests. Since the test organism's response to a reference toxicant should be similar every time it is conducted, a control chart for each test condition and test species can be created. USEPA recommends that the most recent twenty (20) endpoints be displayed and evaluated in the control chart. Each endpoint needs to be within plus or minus 2 standard deviations of the running average endpoint value (e.g., IC_{25}). Reference toxicant tests, control charts, and other Quality Assurance/Quality Control aspects of WET testing are evaluated in detail in the Reviewing WET Tests and WET QA/QC module.

Module 2: USEPA NPDES Testing Methods for WET

USEPA WET Methods Test
Acceptability Criteria (TAC)

- **Valid vs. Invalid test**
 - TAC must be achieved to be accepted as a valid test under NPDES
- **Control Criteria for Freshwater Tests:**
 - minimum survival (acute and chronic)
 - minimum biomass or reproduction (chronic)

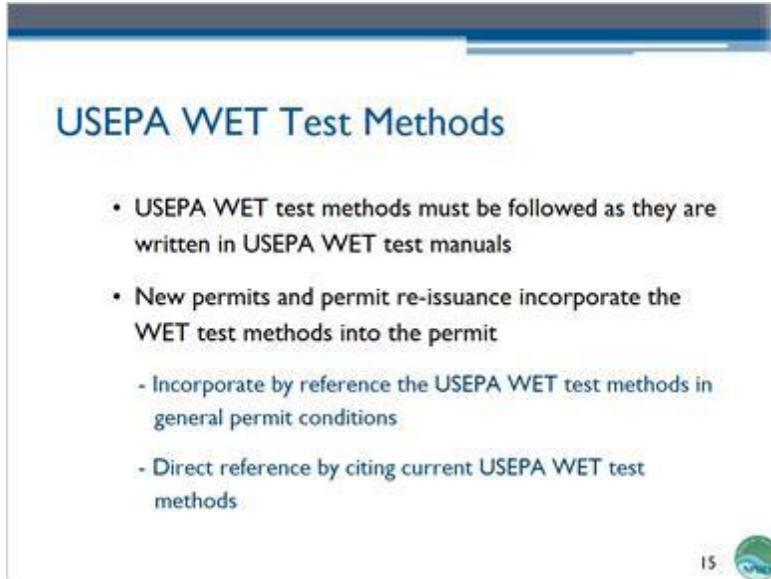
East Coast Control TAC West Coast Control TAC

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Notes:

All USEPA WET tests must meet method-specific Test Acceptability Criteria, or TACs, in order for the WET tests to be considered valid. The TACs for freshwater tests consist of minimum survival, growth and reproduction that is considered acceptable in the controls of the test. For acute WET testing, the TAC is that the controls are to have no more than 10% mortality (or greater than or equal to 90% survival) at the end of the test. Chronic tests include TACs for both survival and biomass or reproduction (sublethal endpoints) depending on the WET test method.

Module 2: USEPA NPDES Testing Methods for WET



USEPA WET Test Methods

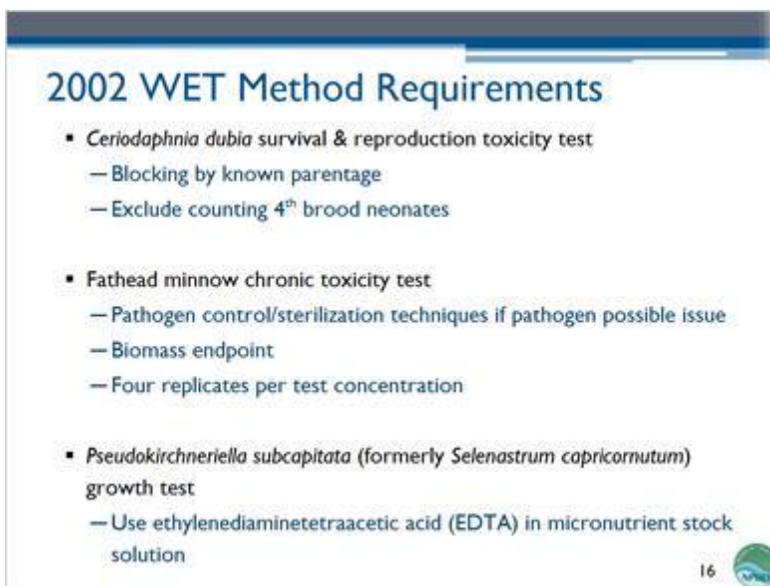
- USEPA WET test methods must be followed as they are written in USEPA WET test manuals
- New permits and permit re-issuance incorporate the WET test methods into the permit
 - Incorporate by reference the USEPA WET test methods in general permit conditions
 - Direct reference by citing current USEPA WET test methods

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Notes:

The USEPA WET test methods must be followed as written. NPDES permit writers should incorporate the WET test methods into new permits and permit re-issuance by incorporation by reference to the USEPA WET test methods in the permit's general permit conditions section or as a direct reference by citing the current USEPA WET test methods.

Module 2: USEPA NPDES Testing Methods for WET



The slide is titled "2002 WET Method Requirements" and lists three main categories of requirements:

- *Ceriodaphnia dubia* survival & reproduction toxicity test
 - Blocking by known parentage
 - Exclude counting 4th brood neonates
- Fathead minnow chronic toxicity test
 - Pathogen control/sterilization techniques if pathogen possible issue
 - Biomass endpoint
 - Four replicates per test concentration
- *Pseudokirchneriella subcapitata* (formerly *Selenastrum capricornutum*) growth test
 - Use ethylenediaminetetraacetic acid (EDTA) in micronutrient stock solution

In the bottom right corner of the slide, there is a small circular logo with a green and blue design, and the number "16" next to it.

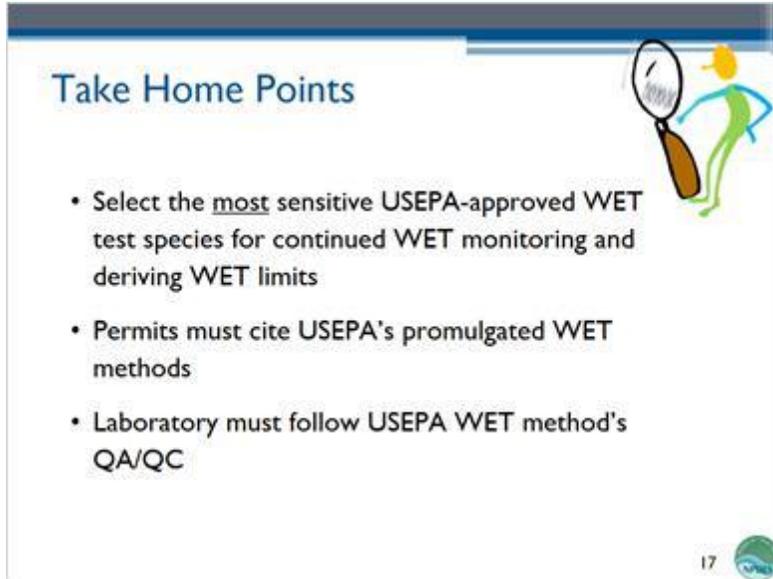
Notes:

Some of the requirements in the USEPA WET test methods as published in the 2002 USEPA WET test methods include those to the *Ceriodaphnia* survival and reproduction toxicity test. These requirements included the use of blocking by known parentage and the exclusion of fourth broods to determine the reproduction endpoint result.

Requirements included in the fathead minnow chronic toxicity test include the ability to control for potential pathogen (microorganism) interference using sterilization techniques, the use of the biomass endpoint, and the use of a minimum of four replicates per test concentration.

The green alga test requires the use of EDTA in micronutrient stock solutions.

Module 2: USEPA NPDES Testing Methods for WET



Take Home Points

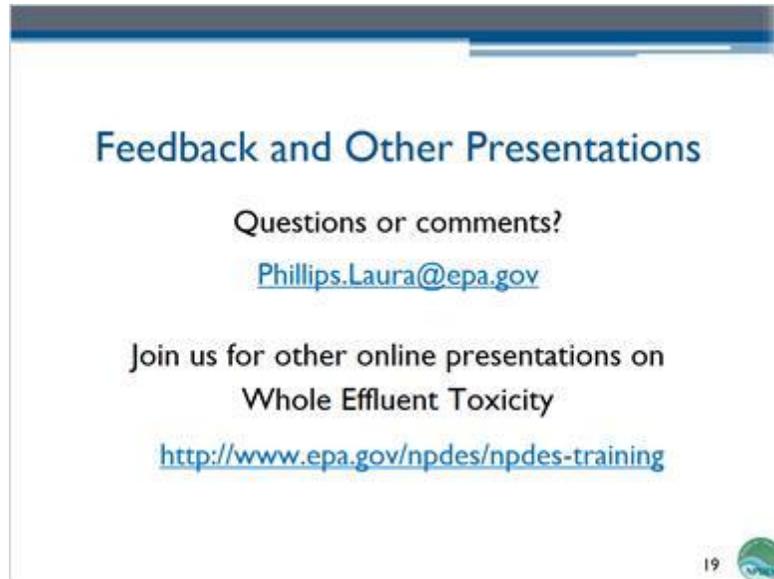
- Select the most sensitive USEPA-approved WET test species for continued WET monitoring and deriving WET limits
- Permits must cite USEPA's promulgated WET methods
- Laboratory must follow USEPA WET method's QA/QC

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Notes:

In conclusion, some of the points that we hope you learned in this module were that the most sensitive USEPA-approved WET test species should be used for continued WET monitoring and for the potential development of NPDES WET permit limits. New NPDES permits and re-issued permits need to cite the most recent USEPA WET test methods either by a direct cite or by incorporation by reference. WET testing laboratories must follow USEPA WET test methods Quality Assurance/Quality Control (QA/QC), which includes the use of negative controls (dilution water) and reference toxicant tests.

Module 2: USEPA NPDES Testing Methods for WET



Notes:

Thank you for joining us for this USEPA's NPDES Whole Effluent Toxicity training presentation. We hope that you have enjoyed it!

If you have questions or comments on this or any part of the USEPA's NPDES WET online training curriculum, click on the email address given on this slide to send a message to Laura Phillips, USEPA HQ National WET Coordinator.

Remember, you will find all of the USEPA's NPDES WET online training presentations, under the USEPA's NPDES training section found on the Office of Wastewater Management's NPDES website.

See you next time!

Module 2: USEPA NPDES Testing Methods for WET



Notes:

The pictures presented here represent some of the USEPA WET test species used in acute and chronic marine WET testing on the East Coast, including *Arbacia punctulata* (a sea urchin), *Menidia beryllina* (the inland silverside), *Cyprinodon variegatus* (the sheepshead minnow), *Americamysis bahia* (formerly *Mysidopsis bahia*, a mysid shrimp), and *Champia parvula* (the red macro-algae).

Module 2: USEPA NPDES Testing Methods for WET

Acute Marine WET Test Methods

	SPECIES	TEST TYPE	ENDPOINTS
Fish	Sheepshead Minnow <i>Cyprinodon variegatus</i> Silversides <i>Menidia beryllina</i> <i>Menidia menidia</i> <i>Menidia peninsulae</i>	24-, 48-, or 96-h static, renewal, or flowthrough	Survival
Invertebrate	<i>Americamysis bahia</i> (formerly <i>Mysidopsis bahia</i>)	24-, 48-, or 96-h static, renewal, or flowthrough	Survival






Notes:

Standard acute marine WET test species include sheepshead minnow and three different species of silversides, as well as the mysid shrimp, *Americamysis bahia* (formerly *Mysidopsis bahia*). As indicated for freshwater acute tests, test length can be 24-, 48-, or 96-hours and can be conducted in a static, static-renewal, or flow-through mode. The only endpoint measured in an acute WET test is lethality.

Module 2: USEPA NPDES Testing Methods for WET

**Short-Term Chronic East Coast Marine
WET Test Methods**

	SPECIES	TEST TYPE	ENDPOINTS
Fish	Sheepshead Minnow <i>Cyprinodon variegatus</i>	7-day or 9-day renewal	Growth Survival Teratogenicity
	Inland Silverside <i>Menidia beryllina</i>	7-day renewal	Growth Survival
Invertebrate	Mysid shrimp <i>Americamysis bahia</i> (formerly <i>Mysidopsis bahia</i>)	7-day renewal	Growth Survival Egg Development
	Sea urchin <i>Arbacia punctulata</i>	1 h and 20 min static	Fertilization
Plant	Red Macroalga <i>Champia parvula</i>	7-day to 9-day static non-renewal	Reduction in cytocarp production



Notes:

USEPA has multiple fish and invertebrates for conducting chronic East Coast marine WET tests, including the sheepshead minnow and inland silverside, the mysid shrimp, and the sea urchin. The plant or algae WET test method is limited to the red macroalga. Durations for most chronic marine East Coast tests are 7 days, but the sea urchin fertilization test is a 1 hour and 20 minute exposure. WET test endpoints for chronic marine East Coast WET tests include survival, growth, egg development, fertilization, and a reduction in cytocarp production (algae reproduction).

Module 2: USEPA NPDES Testing Methods for WET

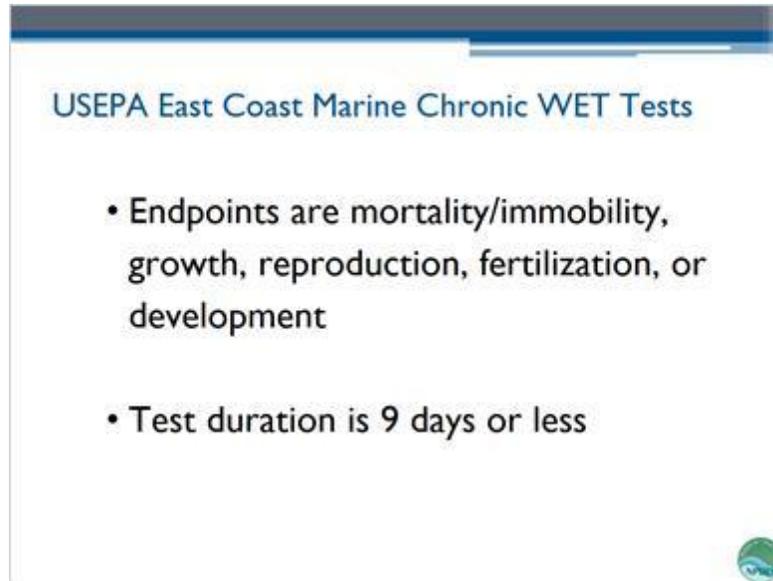
**Short-Term Chronic West Coast Marine
WET Test Methods**

	SPECIES	TEST TYPE	ENDPOINTS
Fish	Topsmelt (<i>Atherinops affinis</i>)	7-day renewal	Growth, Survival
Invertebrate	Mysid shrimp (<i>Holmesimysis costata</i>)	7-day renewal	Growth, Survival
	Pacific Oyster (<i>Crassostrea gigas</i>)	48-hour static	Shell Development, Survival
	Mussel (<i>Mytilus sp.</i>)		
	Red Abalone (<i>Haliotis rufescens</i>)	48-hour static	Shell Development
	Purple Urchin (<i>Strongylocentrotus purpuratus</i>)	72-hour static	Larval Development, Survival
	Sand Dollar (<i>Dendraster excentricus</i>)		
	Purple Urchin (<i>Strongylocentrotus purpuratus</i>)	40-minutes static	Egg Fertilization
	Sand Dollar (<i>Dendraster excentricus</i>)		
Plant	Giant Kelp (<i>Macrocystis pyrifera</i>)	48-hour static	Germination, Length

Notes:

USEPA has standard WET test methods for conducting short-term chronic marine test with species that are more indicative of those on the West Coast, including topsmelt, mysid shrimp, Pacific oyster, mussel, red abalone, purple urchin, sand dollar, and giant kelp. Durations for chronic marine USEPA West Coast WET tests methods vary from 40-minutes for the purple urchin or sand dollar fertilization test, to 48-hours for the Pacific oyster and mussel shell development test, to 7 days for the mysid and topsmelt survival and growth test. WET test endpoints for the USEPA West Coast chronic marine WET test methods include growth, survival, shell development, larval development, egg fertilization, and germination.

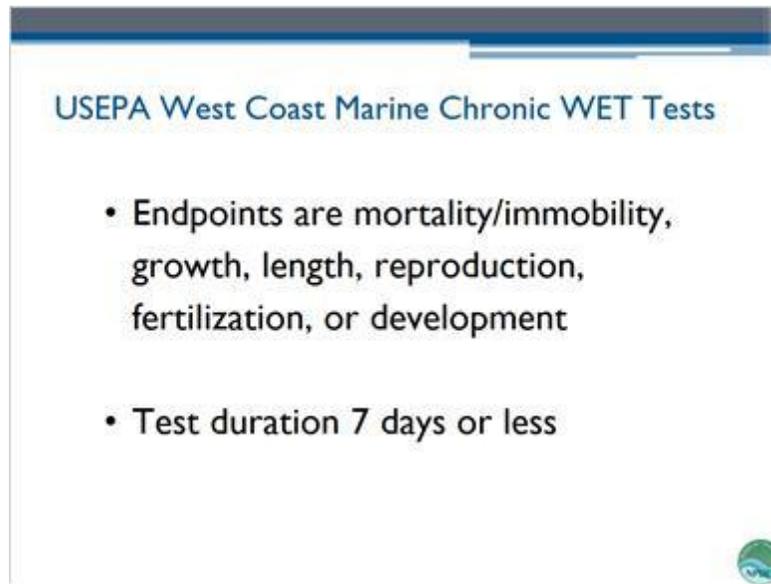
Module 2: USEPA NPDES Testing Methods for WET



Notes:

For USEPA East Coast chronic WET tests, the test endpoints include lethal endpoints measured as mortality or immobility, as well as sublethal endpoints measured as growth, reproduction, fertilization, or development. For USEPA East Coast marine chronic WET tests, the test duration is no longer than 9 days.

Module 2: USEPA NPDES Testing Methods for WET



Notes:

For USEPA West Coast chronic tests, the WET test endpoints include lethal endpoints measured as mortality or immobility, as well as sublethal endpoints measured as growth, length, reproduction, fertilization, or development. For USEPA West Coast marine chronic WET tests, the test duration is no longer than 7 days.

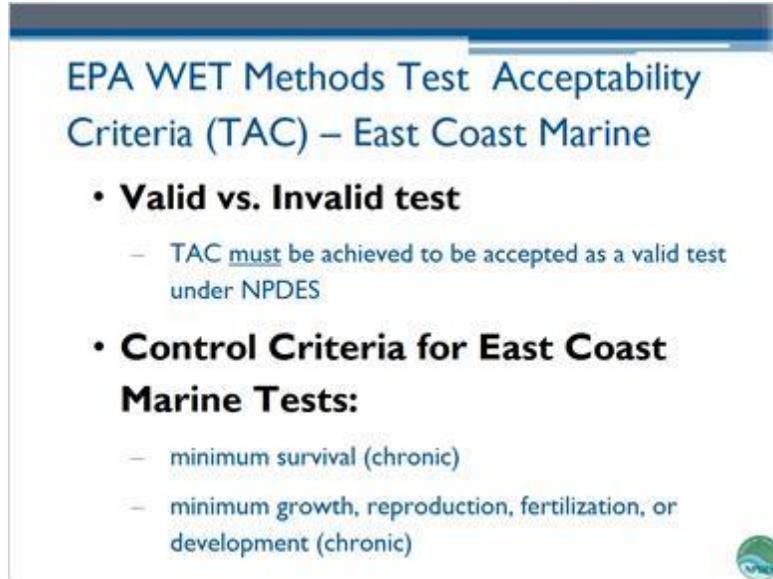
Module 2: USEPA NPDES Testing Methods for WET



Notes:

The pictures presented here represent some of the USEPA WET test species used in chronic marine WET tests on the West Coast of the United States, including *Atherinops affinis* (the topsmelt), *Holmesimysis costata* (a mysid shrimp), *Crassostrea gigas* (the Pacific oyster), *Mytilus sp.* (a blue mussel), *Strongylocentrotus purpuratus* (the purple sea urchin), *Macrocystis pyrifera* (the giant kelp), and *Dendraster excentricus* (a sand-dollar).

Module 2: USEPA NPDES Testing Methods for WET



EPA WET Methods Test Acceptability Criteria (TAC) – East Coast Marine

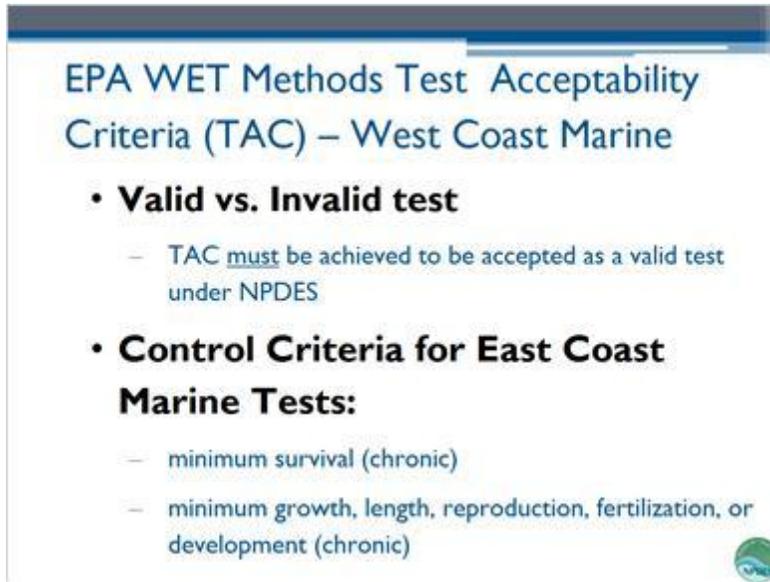
- **Valid vs. Invalid test**
 - TAC must be achieved to be accepted as a valid test under NPDES
- **Control Criteria for East Coast Marine Tests:**
 - minimum survival (chronic)
 - minimum growth, reproduction, fertilization, or development (chronic)



Notes:

For acute USEPA East Coast marine WET testing, the TAC is that the test controls have no more than 10% mortality or no less than 90% survival at the end of the WET test. Chronic tests include TACs on both survival (lethal endpoints) and on growth, reproduction, fertilization, or development (sublethal endpoints) depending on the WET test method.

Module 2: USEPA NPDES Testing Methods for WET



EPA WET Methods Test Acceptability Criteria (TAC) – West Coast Marine

- **Valid vs. Invalid test**
 - TAC must be achieved to be accepted as a valid test under NPDES
- **Control Criteria for East Coast Marine Tests:**
 - minimum survival (chronic)
 - minimum growth, length, reproduction, fertilization, or development (chronic)



Notes:

Chronic USEPA West Coast marine WET tests include TACs for both survival (lethal endpoints) and for growth, length, reproduction, fertilization, or development (sublethal endpoints) depending on the WET test method.